Lesson 3 : Bounds for the Laplacien eigenvalues on Euclidean domains and surfaces, by B. Colbois and A. El Soufi.

1. Wolf-Keller result for extremal domains and other qualitative results on extremal eigenvalues.
2. Optimization of the first and second Dirichlet eigenvalues on Euclidean domains with constraints : e.g. the problem of optimal placement of an obstacle.
3. Construction of small eigenvalue. The Cheeger constant and the Cheeger inequality. T. The case of hyperbolic surfaces.
4. The inequalities of Reilly-Chavel and of Hersch ; presentation of the barycentric methods.
5. Upper bounds : the case of negatively curved manifolds, and the approach of Korevaar and Grigor'yan-Netrusov-Yau.
6. Extremal surfaces and open questions.
7. Some examples of upper bounds using Grigor'yan-Netrusov-Yau and open questions.